

AMENDMENTS TO THE CLAIMS

The following listing of claims will replace all prior versions and listings of claims in the application.

LISTING OF CLAIMS

1. (Cancelled.)

2. (Withdrawn and Currently Amended) The fastening system of Claim 39 [[1]] further comprising a stationary die always aligned with a punch of the machine, the die not having movable components.

3. (Withdrawn and Currently Amended) The fastening system of Claim 39 [[1]] further comprising a sensor operably sensing a fastener characteristic and a controller automatically varying a fastener insertion feature of the machine in response to the fastener characteristic sensed.

4. (Withdrawn) The fastening system of Claim 3 wherein the fastener characteristic is fastener size.

5. (Withdrawn) The fastening system of Claim 3 wherein the fastener characteristic is fastener insertion force.

6. (Withdrawn) The fastening system of Claim 3 wherein the fastener characteristic is fastener presence in the machine.

7. (Withdrawn) The fastening system of Claim 3 wherein the fastener characteristic is fastener location relative to the workpiece.

8. (Withdrawn) The fastening system of Claim 3 wherein the fastener characteristic is thickness of the workpiece.

9. (Withdrawn) The fastening system of Claim 3 wherein the fastener insertion feature is insertion speed, greater than zero.

10. (Withdrawn) The fastening system of Claim 3 wherein the fastener insertion feature is de-energization of the actuator.

11. (Cancelled).

12. (Withdrawn and Currently Amended) The fastening system of Claim 30 [[1]] wherein the fastener is a self-piercing nut including a bore internally located in the body, and a [[the]] thread is located in the bore.

13. (Withdrawn) The fastening system of Claim 12 further comprising a bolt enmeshed with the bore of the fastener.

14. (Cancelled).

15. (Withdrawn and Currently Amended) The fastening system of Claim 30 further comprising 1 wherein the workpiece is an automotive body panel, an unthreaded portion of the fastener engaging with the automotive body panel after the fastener setting.

16. (Withdrawn and Currently Amended) The fastening system of Claim 30 further comprising 1 wherein the workpiece is a computer panel, an unthreaded portion of the fastener engaging with the computer panel after fastener setting.

17. (Withdrawn and Currently Amended) The fastening system of Claim 36 [[1]] wherein a [[the]] body of the fastener is a substantially cylindrical and elongated stud.

18-29. (Cancelled).

30. (Currently Amended) A fastening system comprising:
a threaded fastener, threads on the fastener being accessible even after fastener setting; and
a machine automatically operable to drive the fastener, the machine comprising:

(a) a C-frame;

(b) at least one transmission housing coupled to the C-frame;

(c) an electric motor;

(d) a transmission coupled to the motor, at least a portion of the transmission being located in the transmission housing; and

(e) a punch coupled to the transmission;

wherein the transmission operably transmits rotary motion of the motor to linear motion of the punch to operably push the fastener.

31. (Original) The fastening system of Claim 30 further comprising at least one sensor coupled to the machine and a controller connected to the machine, the sensor operably sensing a fastener characteristic and the controller automatically varying a fastener insertion feature of the machine in response to the fastener characteristic sensed.

32. (Original) The fastening system of Claim 31 wherein the fastener characteristic is fastener size.

33. (Original) The fastening system of Claim 31 wherein the fastener characteristic is fastener insertion force.

34. (Original) The fastening system of Claim 31 wherein the fastener characteristic is fastener presence in the machine.

35. (Original) The fastening system of Claim 31 wherein the fastener insertion feature is insertion speed, greater than zero.

36. (Currently Amended) ~~The fastening system of Claim 30 further comprising A fastening system comprising:~~

a threaded fastener;

a machine automatically operable to drive the fastener, the machine comprising:

(a) a C-frame;

(b) at least one transmission housing coupled to the C-frame;

(c) an electric motor;

(d) a transmission coupled to the motor, at least a portion of the transmission being located in the transmission housing; and

(e) a punch coupled to the transmission;

wherein the transmission operably transmits rotary motion of the motor to linear motion of the punch to operably push the fastener; and

a threaded member removably enmeshed with the fastener and a component secured to the fastener by the member.

37. (Original) The fastening system of Claim 36 wherein the component is an electrical connector.

38. (Original) The fastening system of Claim 36 wherein the component is a circuit board.

39. (Currently Amended) ~~The fastening system of Claim 30~~ A fastening system comprising:

a threaded fastener; and

a machine automatically operable to drive the fastener, the machine comprising:

(a) a C-frame;

(b) at least one transmission housing coupled to the C-frame;

(c) an electric motor;

(d) a transmission coupled to the motor, at least a portion of the transmission being located in the transmission housing; and

(e) a punch coupled to the transmission;

wherein the transmission operably transmits rotary motion of the motor to linear motion of the punch to operably push the fastener; and

wherein the fastener is a self-piercing nut including a substantially cylindrical internal surface between a piercing end and a threaded segment prior to insertion in a workpiece.

40. (Previously Presented) The fastening system of Claim 30 wherein the fastener is a self-piercing stud including a substantially cylindrical internal surface between a piercing end and a threaded segment prior to insertion in a workpiece.

41. (Previously Presented) The fastening system of Claim 30 further comprising:

a die attached to the C-frame, the die always being substantially aligned with the punch, the fastener being prevented from directly contacting the die, all of the die being stationary during joint creation; and

a robotic arm coupled to at least one of the housing and the C-frame.

42. (Original) A fastening system comprising:

at least a pair of automotive vehicle panels;

a clinch nut comprising a cylindrically tapered end which self-pierces into the panels and diverges during installation, the nut further comprising an internally threaded body;

a non-fluid powered actuator;

a driver operably inserting the nut into the panels;

a transmission coupling the actuator to the driver;

a sensor operably sensing a fastening characteristic; and

a controller automatically controlling installation of the fastener into the panels in response to the sensed fastening characteristic.

43. (Original) The fastening system of Claim 42 wherein the fastener characteristic is fastener size.

44. (Original) The fastening system of Claim 42 wherein the fastener characteristic is fastener insertion force.

45. (Original) The fastening system of Claim 42 wherein the fastener characteristic is fastener location relative to the workpiece.

46. (Currently Amended) The fastening system of Claim 42 further comprising:

a housing containing at least portions of the transmission and driver;
a C-frame attached to the housing;
a die attached to the C-frame, the die always being substantially aligned with the driver, all of the die being stationary during joint creation; and
a robotic arm coupled to at least one of the housing and the C-frame.

47. (Original) The fastening system of Claim 42 wherein the actuator is an electric motor.

48. (Original) The fastening system of Claim 42 wherein the transmission operably converts rotary motion of the actuator into linear motion of the driver.

49. (Withdrawn and Currently Amended) ~~A fastener comprising:~~ The fastening system of Claim 30 wherein the fastener further comprises:

an elongated shaft including the threads which have an external thread-like pattern with an outside diameter; and

a workpiece-engaging section attached to the shaft at a proximal end and having a self-piercing distal end;

the workpiece-engaging section having a pre-installed outside diameter substantially the same as that of the shaft and without an undercut prior to installation.

50. (Withdrawn and Currently Amended) The fastening system fastener of Claim 49 wherein the distal end outwardly diverges when installed.

51. (Withdrawn and Currently Amended) The fastening system fastener of Claim 49 wherein the workpiece-engaging section directly extends from the shaft free of a transversely enlarged flange.

52. (Withdrawn and Currently Amended) The fastening system fastener of Claim 49 wherein the workpiece-engaging section is substantially hollow within a pre-installed substantially cylindrical wall, a roof of the workpiece-engaging section adjacent the shaft is substantially flat and parallel to an exposed end of the shaft.

53-69. (Cancelled).